

# Status of Event Clusters

DTRA Program Review

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# Overview

- Purpose and Approach
- Data Cluster Compilation
- Data Analysis
- Validation
- Results of First Cycle
- Future Work and Milestones

# Purpose and Approach

- Provide additional reference events that can be used in validation testing
- Provide patterns of empirical station travel time corrections that can be compared with model SSSCs
- Two independent methods (JHD at CMR and HDC at CU)

# Compilation of JHD Cluster Data

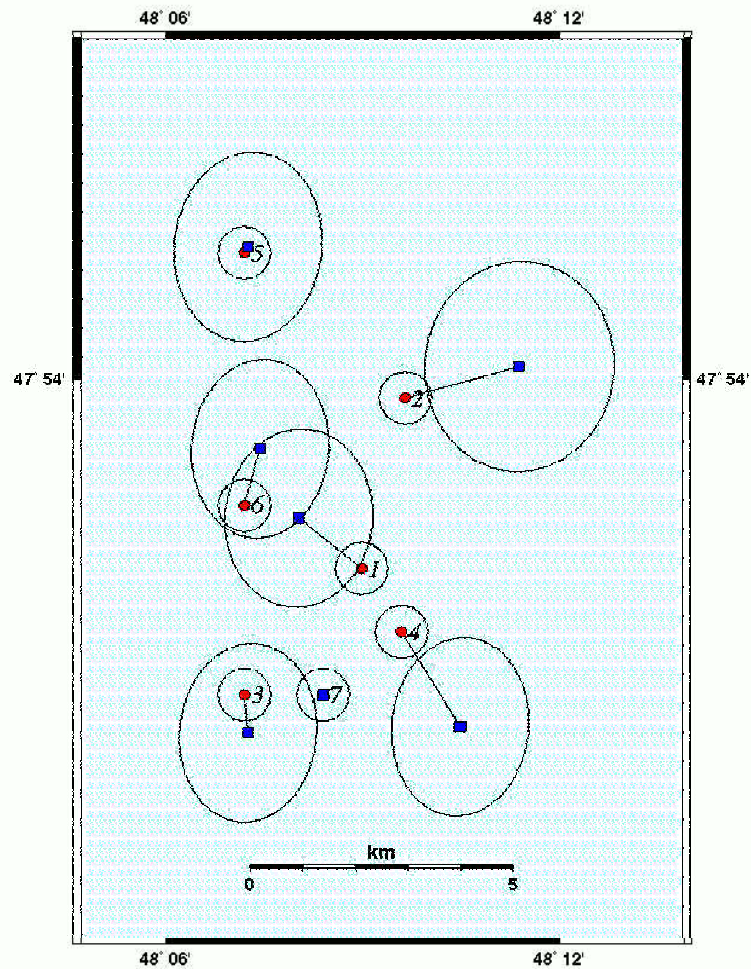
- Select driver event from CMR Reference db
- Search NEIS web site for largest 35 events within given distance (~35 km) and period
- Retrieve arrival data from ISC web site (historic) and NEIS ftp site (recent)
- Load into temporary accounts of CMR db

# JHD Analysis

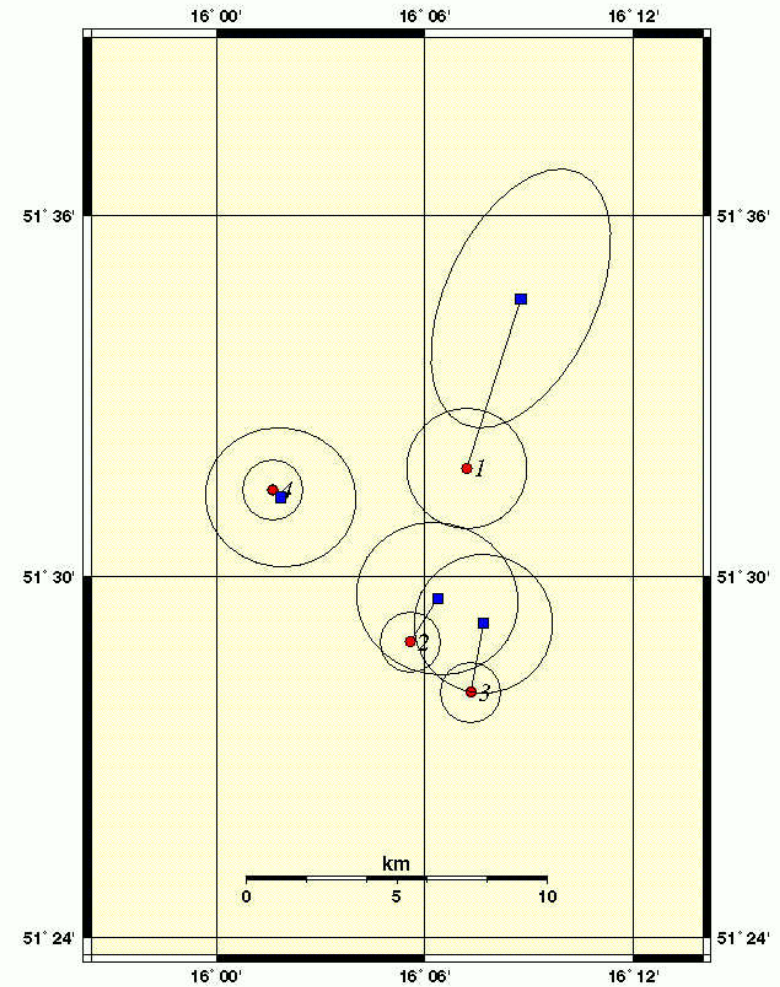
- Computer program, jhd89, by Dewey.
- Weighted least squares with uniform error reduction.
- Max 25 events and 250 stations.
- First P only
- Depth fixed at that of reference event.
- Jhd89 applied in 3 iterations with successive event and arrival pruning.

# Validation of JHD locations

AZGIR EVENTS; GT (circle), JHD (square)



LUBIN, POLAND; GT (circle), JHD (square)



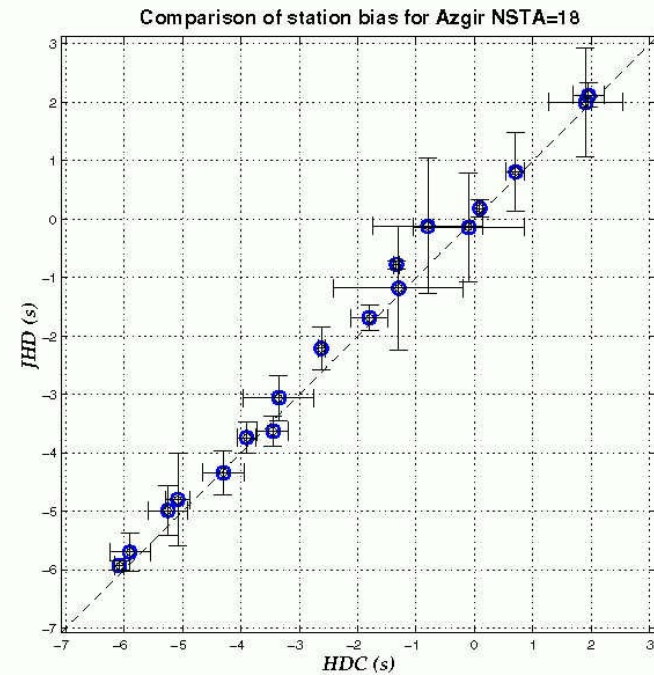
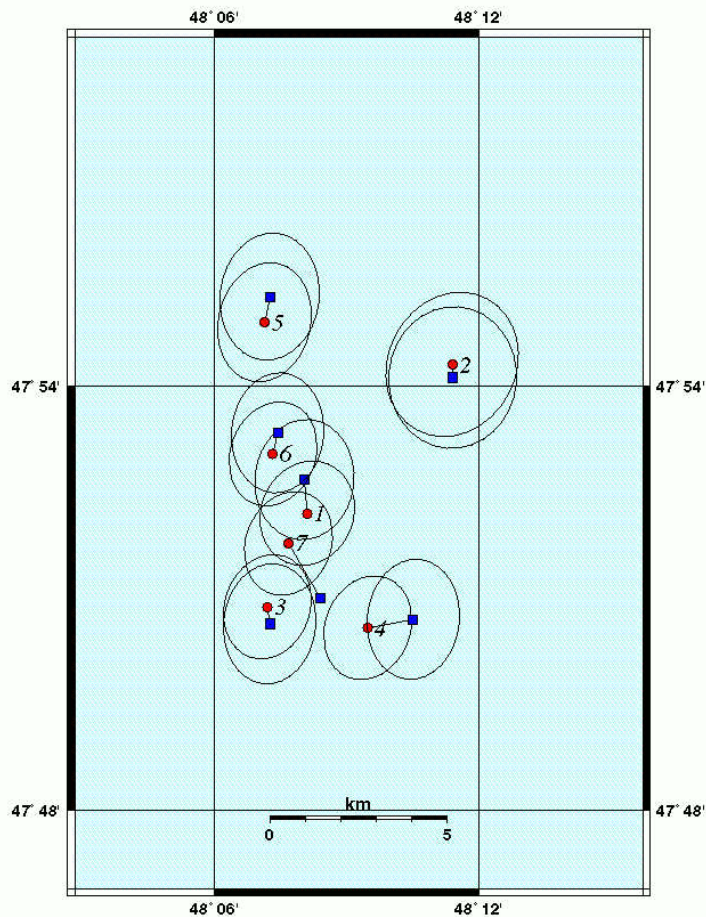
# HDC for Event Clusters (Engdahl and Bergman)

*HDC = Hypocentroidal Decomposition*

- No master event required
- A priori measurements errors
- Computationally efficient for larger problems

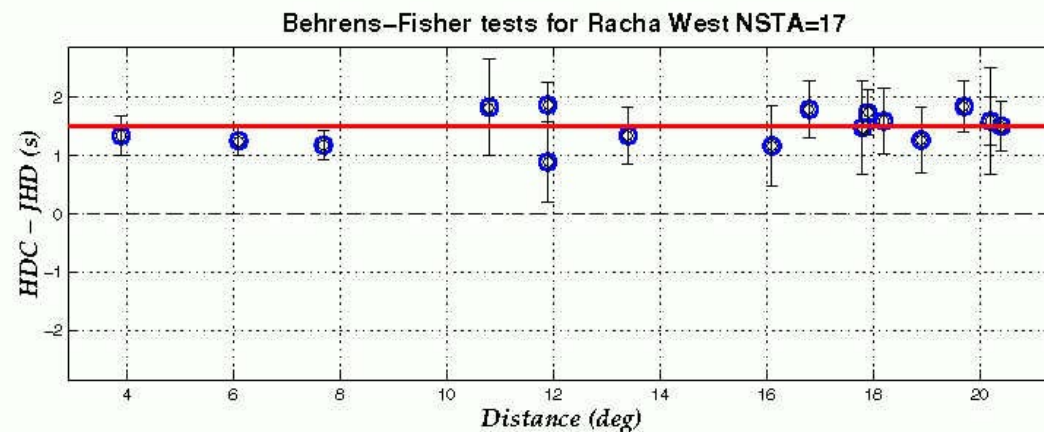
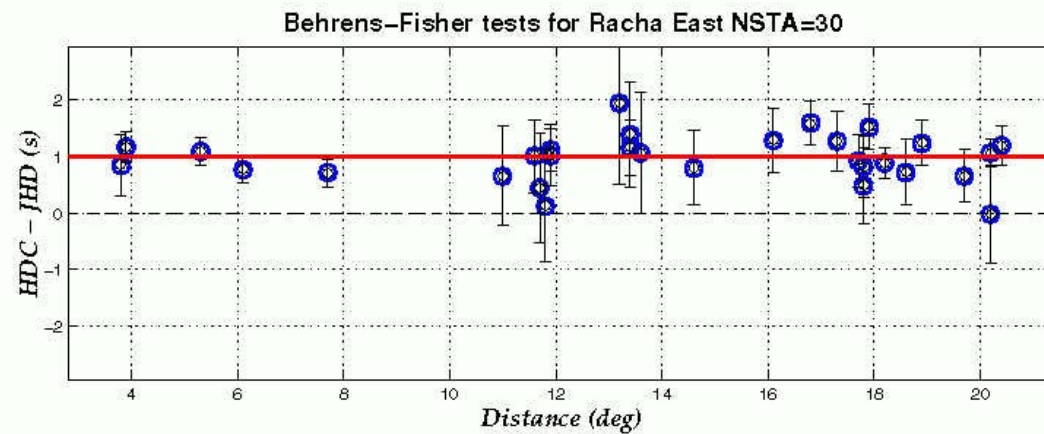
# JHD and HDC Cross Validation (same input data)

AZGIR EVENTS; HDC (square), JHD (circle)

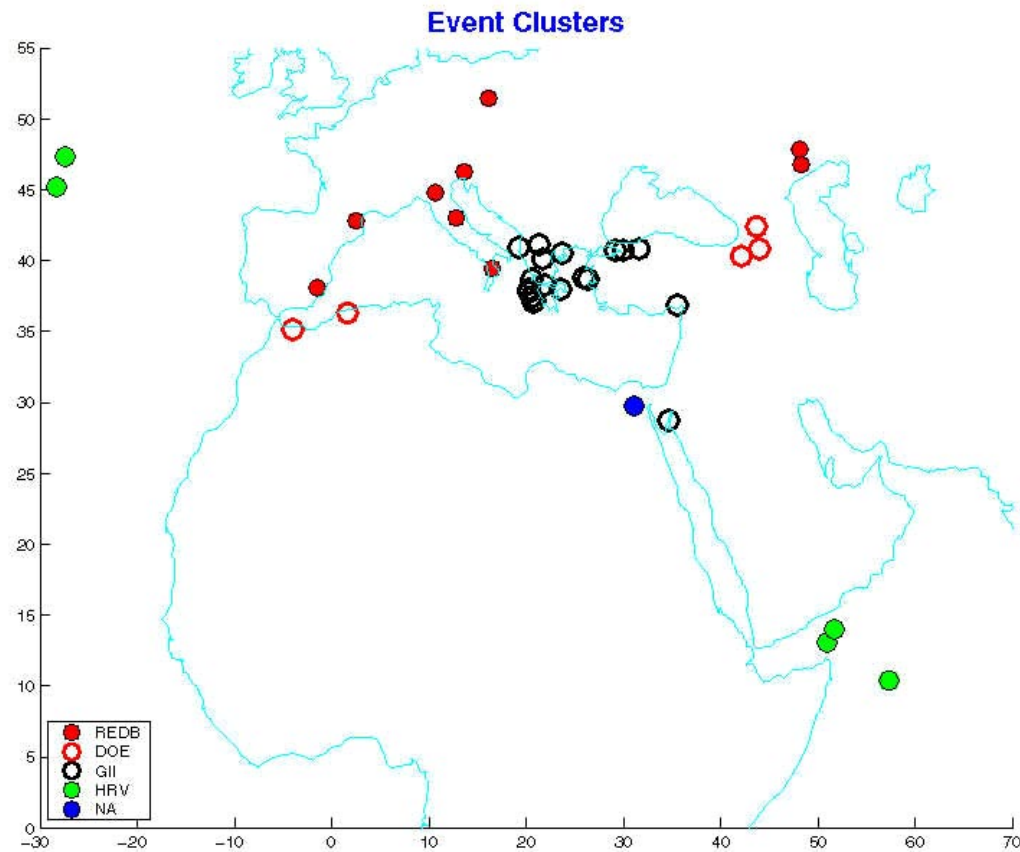




# JHD and HDC Cross Validation (different input data)

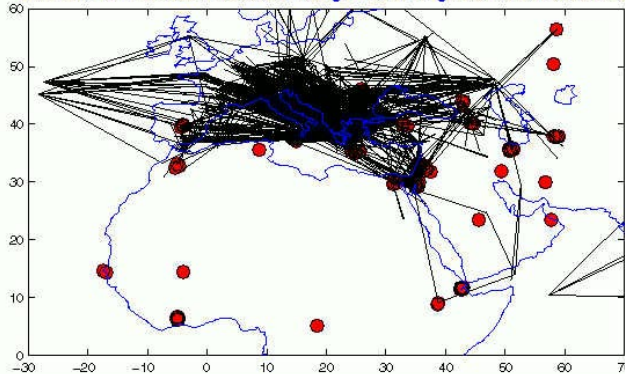


# Clusters analyzed in 1st cycle

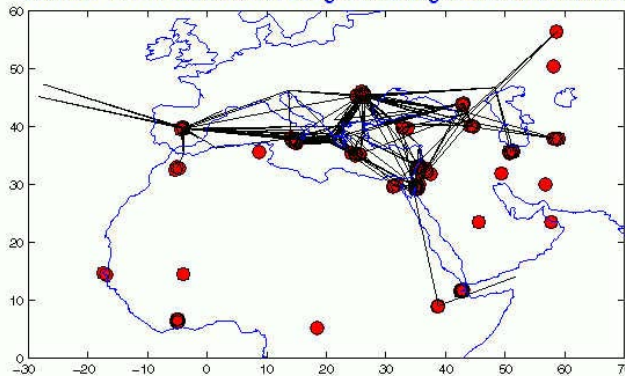


# Regional Cluster-Station paths (1st cycle)

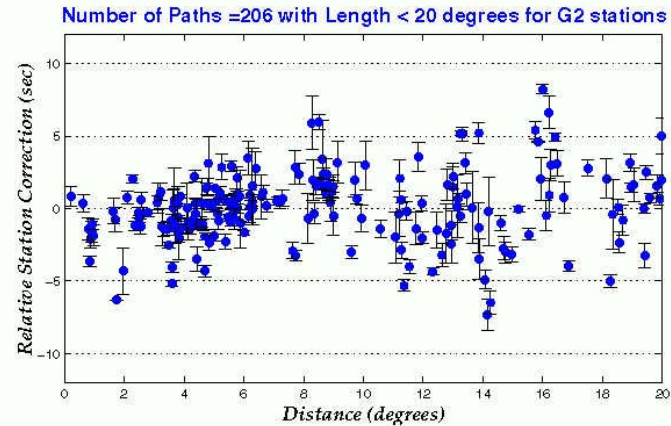
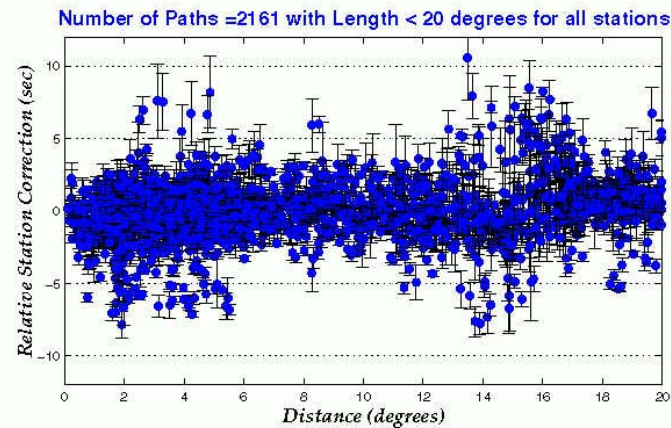
Number of Paths = 2163 with Length < 20 degrees for all stations



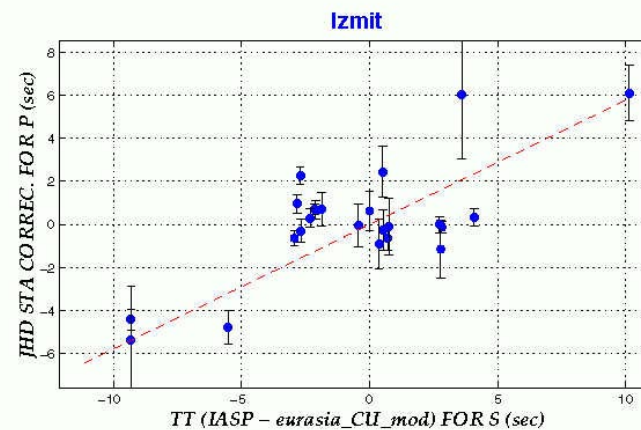
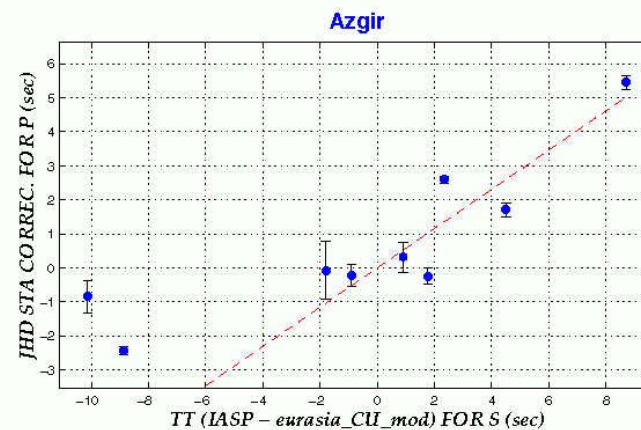
Number of Paths = 206 with Length < 20 degrees for G2 stations



# Range of variation of regional station travel time corrections



# Comparison of JHD and modeled corrections (1st cycle)



# Future Work and Milestones

## Short term

- Revise JHD analysis with emphasis on event clusters in Europe (April 1)
- Provide additional reference events for June delivery (April 15)
- Document Cluster analysis procedures (draft May 1)
- Document Comparison of Model and Empirical corrections (draft May 15)

## Ongoing and Long term

- Compile clusters in areas without reference event data
- Analyze effect of depth
- Assess uncertainties of station corrections from sub cluster analysis